CALIBRATION STANDARD REQUIREMENT

FOR AN

ABSOLUTE PRESSURE CONTROL SYSTEM

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PROCUREMENT PACKAGE

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Code MS-33
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1. SCOPE

1.1 Scope. This requirement defines the mechanical, electrical, and electronic characteristics for an Absolute Pressure Control System. This equipment is intended to be used by Navy personnel in shipboard and shorebased laboratories to provide control and switching capabilities for the calibration of absolute pressure gauges. For the purposes of this requirement, the Absolute Pressure Control System shall be referred to as the APCS.

1.2 APCS System. The APCS shall consist of a pressure control unit (PCU), Vacuum Pump (VP), Adapter Kit (AK), and hose assemblies.

2. APPLICABLE DOCUMENTS

2.1 Controlling Specifications. MIL-T-28800, “Military Specification, Test Equipment for use with Electrical and Electronic Equipment, General specification, for,” and all documents referenced therein of the issues in effect on the date of this solicitation shall form a part of this requirement.

3. REQUIREMENTS

3.1 General. The APCS shall conform to the Type II, Class 5, Style E requirements as specified in MIL-T-28800 for Navy shipboard and shorebased use as modified below. The use of material restricted for Navy use shall be governed by MIL-T-28800.

3.1.1 Design and Construction. The ACS design and construction shall meet the requirements of MIL-T-28800 for Type II equipment.

3.1.2 Power Requirements. The APCS shall operate from a source of 103.5V to 126.5V at 50 Hz and 60 Hz ± 5% single-phase input power as specified in MIL-T-28800.

3.1.2.1 Power Connection. The requirements for power source connections shall be in accordance with MIL-T-28800 with a 6 foot (1.8 m) minimum length core.

3.1.3 Dimensions. Maximum dimensions for the PCU shall not exceed 16 (40.6 cm) inches in width, 12 (30.5 cm) inches in height, and 16 (40.6 cm) inches in depth. Maximum dimensions for the AK shall not exceed 13 inches (33 cm) in width, 13 inches (33 cm) in height, and 13 inches (33 cm) in depth. Maximum dimensions for the VP shall not exceed 6 inches (15.2 cm) in width, 10 inches (25.4 cm) in height, and 15 inches (38 cm) in depth.

3.1.3.1 Weight. The weight shall not exceed 25 pounds (11.4 kg) for the PCU, 15 pounds (7 kg) for the AK, and 30 pounds (25 kg) for the VP.

3.2 Environmental Requirements. The APCS shall meet the environmental requirements for a Type II, Class 5, Style E equipment with the deviations specified below.

3.2.1 Temperature and Humidity. The APCS shall meet the conditions below:

	Temperature (°C)	Relative Humidity (%)
Operating	10 to 30	95
	30 to 40	75
Non-operating	-40 to 70	Not Controlled

3.2.2 Electromagnetic Compatibility. The electromagnetic compatibility requirements of MIL-T-28800 are limited to the following areas: CE01, CE03, CS01, CS02, CS06, RE01, RE01 (14 kHz to 1 Ghz), and RS03.

3.3.1 Calibration Interval. The APCS shall have an 85% or greater probability of remaining within tolerances of all requirements at the end of a 12 month period.

3.4 Maintainability. The APCS shall meet the Type II maintainability requirements as specified in MIL-T-28800 except the lowest discrete component shall be defined as a replaceable assembly. Certification time shall not exceed 60 minutes.

3.5 Performance Requirements. The APCS shall provide the following capability as specified below. Unless otherwise indicated, all requirements shall be met following a 30-minute warm-up period.

3.5.1 Pressure Control Unit (PCU).

3.5.1.1 Pressure Range. The PCU shall be capable of providing control and switching capabilities throughout the range of Vacuum to 170 psig.

3.5.1.2 Supply Pressure. The PCU shall be capable of handling supply pressures up to a maximum of 3,000 psig.

3.5.1.3 Pressure Regulator. The PCU shall have a pressure regulator capable of regulating the supply pressure such that the maximum pressure output is 170 psig.

3.5.1.4 Pressure Venting. The PCU shall automatically vent to atmosphere whenever the applied pressure exceeds 200 psig. Automatic venting shall be directed away from the operator and PCU controls. The PCU shall also contain an independent, manual method of venting the pressure.

3.5.1.5 Filtration. The PCU shall have a filter that filters the flow to 10 microns or better.

3.5.1.6 Test Media. The PCU shall use gaseous Nitrogen as a test media.

3.5.2 Vacuum Pump (VP). The VP shall be an oil sealed, rotary vane, direct drive type or equivalent.

3.5.2.1 Power Requirements. The VP shall operate from a source of 115V at 60 Hz ± 5% single-phase input power as specified in MIL-T-28800.

3.5.2.2 Free Air Replacement. The VP shall provide 1.8 CFM or more of free air replacement.

3.5.2.3 Ultimate Pressure. The VP shall provide 1 micron or better ultimate pressure.

3.5.2.4 Handle. The VP shall have a carrying handle mounted on the top.

3.5.2.5 Vacuum Pump Oil. A minimum of one gallon of vacuum pump oil that is breakdown resistant at high RPM shall be included with the VP.

3.5.2.6 Exhaust Filter. The VP shall have an exhaust filter that filters to at least a 0.3 micron particle size. The exhaust filter shall be easily replaceable.

3.5.2.7 Connections. The VP shall have a NW 16 intake connection and a threaded 3/4-20 exhaust connection.

3.6 Operating Requirements. The APCS shall provide the following operating capabilities.

3.6.1 Front Panel Control Requirements. All modes and functions shall be operable using front panel controls. The locations and labeling of indicators, controls, and switches shall provide for maximum clarity and easily understood operation without reference to tables, charts, or flow diagrams. The front panel shall contain as a minimum the following features.

a. Pressure/vacuum control valve

b. Pressure/vacuum selector valve

c. Supply pressure source port

d. Supply pressure outlet port

e. Test pressure outlet port

f. Reference vacuum source port

g. Reference vacuum test port

h. Test vacuum source port

i. Thermocouple gage tube

3.6.1.1 Pressure Ports (Supply and Test). The pressure port assemblies shall be of the quick-disconnect type located on the front panel and aligned in a vertical plane. Adequate clearance shall be allowed for easy installation and removal of test hoses. Chained captive dust caps shall also be supplied.

3.6.1.2 Pressure Hoses (Supply and Test). Flexible pressure hose assemblies with quick-disconnect fittings shall be supplied for connecting the supply pressure source to the PCU and for connecting the PCU test pressure output port to an external device. The pressure hoses shall be of stainless steel construction, with a rated pressure of 3,000 psig, a proof pressure of 4,500 psig, and a burst pressure of 12,000 psig minimum. Chained captive dust caps shall also be supplied.

3.6.1.2.1 Pressure Hose assemblies. The following pressure hoses shall be included with the APCS. The pressure hoses shall be a minimum 5 feet (1.5m) in length:

a. Pressure test hose assembly.

b. Pressure supply hose assembly.

c. Reference vacuum hose assembly.

d. Reference port vacuum hose assembly.

e. Test vacuum hose assembly.

3.6.1.3 Vacuum Ports (Reference and Test). The vacuum port assemblies shall be of the quick-disconnect type located on the front panel. Adequate clearance shall be allowed for easy

installation and removal of test hoses. Chained captive dust caps shall also be supplied.

3.6.1.4 Vacuum Hoses. Three flexible vacuum hoses with quick-disconnect fittings shall be supplied with the PCU. They are for connecting the PCU to the reference vacuum pump, the test vacuum pump, and the reference vacuum port of an external devices. The vacuum hoses shall be at least 5 feet (1.5m) long.

3.6.1.5 Thermocouple Gauge Tube. The PCU shall contain a thermocouple gauge tube for monitoring the reference vacuum circuit. The thermocouple gage tube shall measure vacuum to +/- 20% or better.

3.6.1.6 Plumbing. All plumbing utilized in the PCU shall be stainless steel.

3.7 Accessories. The APCS shall include the following accessories.

3.7.1 Test Instrument Adapter Kit. The test instrument adapter kit shall consist of the following stainless steel adapters:

1/4 inch male superpressure to quick disconnect

1/4 inch male AN to quick disconnect

1/8 inch male pipe thread to quick disconnect

1/4 inch male pipe thread to quick disconnect

3/8 inch male pipe thread to quick disconnect

1/2 inch male pipe thread to quick disconnect

1/8 inch female pipe thread to quick disconnect

1/4 inch female pipe thread to quick disconnect

3/8 inch female pipe thread to quick disconnect

1/2 inch female pipe thread to quick disconnect

3.7.1.1 Adapter Design. The adapters shall be of stainless steel construction, with a rated pressure 3,000 psig, a proof pressure of 4,500 psig, and a burst pressure of 12,000 psig minimum. The adapters shall have hex flats to facilitate adapter installation and removal.

3.7.1.2 Adapter packaging. The adapters shall be contained within a heavy-duty, durable reusable box labeled “Adapter Kit”.

3.8 Manual. At least two copies of an operation and maintenance manual shall be provided. The manual shall meet the requirements of MIL-M-7298.

3.8.1 Calibration Procedure. A calibration procedure in accordance with MIL-M-38793 shall be provided.